CHAPTER 4

MGB 13-22 BAYS WITHOUT LRS
(where water level or any obstructions are at least 2.7m below bank heights)

STEP 1. Measure the AR gap (see page 5).

STEP 2. Select a bridge.

Using column (a) of Table 10, choose a bridge whose AR gap range brackets the AR gap measured. Always select the smallest range possible to avoid wasting assets. For example, if the AR gap measured 34.2m, choose the AR gap range of 32.3m to 34.6m, even though the range of

34.1m to 36.4m also meets the criteria. Read the bay configuration column (c). Check the MLC of the bridge column (d) to ensure that it meets what is specified by the tasking authority.

STEP 3. Read the bridge length column (b).

STEP 4. Read the R distance column (f).

Table 10. **DS MGB 2E + 13 through 2E + 22 bays without LRS (where water or any obstructions are at least 2.7m below bank heights)**

						Launch Design								
Site Dimensions						Rule 1 Nose lift N with nose cross girder at —				Other methods of adjusting N & T				
										Rule 2 Raise RRB & CRB by 0.25m		Rule 3a Lower RRB to Increase N	Rule 3b Lower CRB to Increase T	
AR Gap (a)	Brg Lgth (b)	2E + # of Bays (c)	MLC (d)	Nose Const * (e)	R Dist (f)	Tail Lift T (g)	Hole #6 ** (h)	Hole #4 ** (i)	Hole #2 ** (j)	N (k)	T (l)	N (m)	T (n)
28.6–30.9	33.2	13	50	6N1	27.4	0.40	–0.07	1.49	2.68	2.93	0.65	1.9 (0.82–G)	0.2 (2.93–H)
30.5–32.8	35.1	14	50	7N1	28.7	0.37	–0.38	1.00	2.65	2.90	0.62	1.9 (0.79–G)	0.2 (2.90–H)
32.3–34.6	36.9	15	40	7N1	28.7	0.34	–0.49	0.90	2.55	2.80	0.59	1.9 (0.76–G)	0.2 (2.80–H)
34.1–36.4	38.7	16	40		29.6	0.30	–0.61	0.79	2.43	2.68	0.55	1.9 (0.72–G)	0.2 (2.68–H)
35.9–36.2	40.1	17	30	8N1	29.3	0.27	–0.15	0.75	2.69	2.94	0.52	1.9 (0.69–G)	0.2 (2.94–H)
37.8–40.1	42.4	18	30	8N1	29.3	0.24	–1.33	0.54	2.54	2.79	0.49	1.9 (0.66–G)	0.2 (2.79–H)
39.6–41.9	44.2	19	24	6N1 + 3N2	34.8	0.21	–2.04	–0.19	1.72	1.97	0.46	1.9 (0.63–G)	0.2 (1.97–H)
41.4–43.7	46.0	20	24	6N1 + 3N2	38.4	0.21	–1.93	–0.31	1.61	1.86	0.46	1.9 (0.63–G)	0.2 (1.86–H)
43.3–45.6	47.9	21	20		38.4	0.18	–2.65	–0.52	1.17	1.42	0.43	1.9 (0.69–G)	0.2 (1.42–H)
45.7–47.4	49.7	22	16		40.1	0.15	–2.58	–0.68	1.04	1.29	0.40	1.9 (0.57–G)	0.2 (1.29–H)

* Each nose includes a complete light nose.
** Nose cross girder setting 6, 4, and 2 is the position of the cross girder resting on the 6th, 4th, and 2d hole from the bottom of the LNCG post.

Figure 7. **Key construction points for DS MGB 13 through 22 bays without LRS**
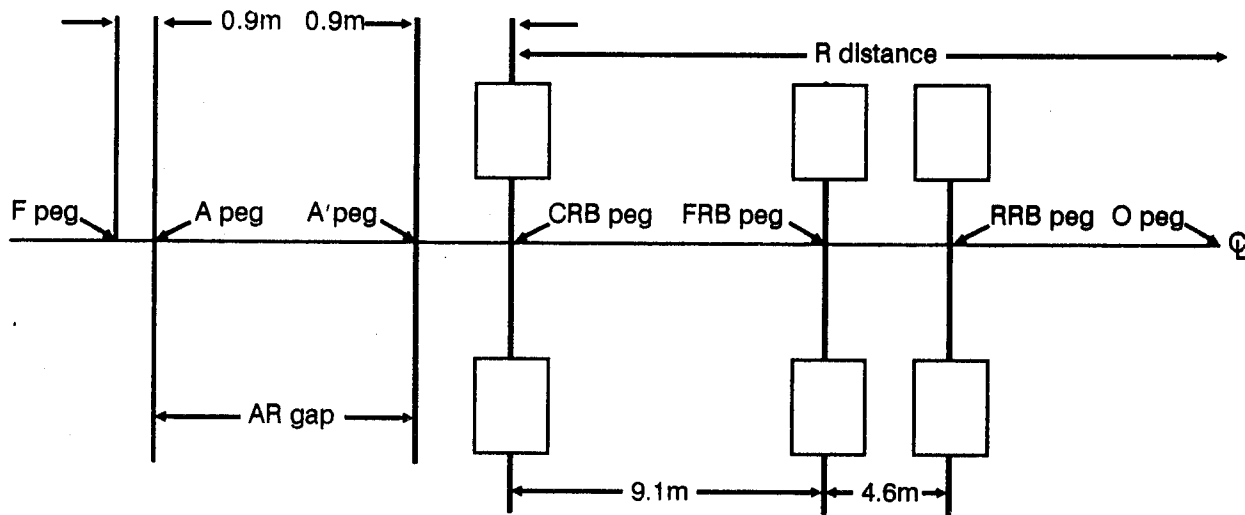
STEP 5. Read and note the nose construction column (e).

STEP 6. Identify key construction points.
These are constant for any DS bridge construction 13 through 22 bays without LRS (Figure 7).

F peg – Designates the approximate location of the far bank end of bridge. It is initially placed 0.9. from A peg on far bank.

CRB peg – Designates the location of the capsill roller beam. It is placed 0.9m from the A' peg on near bank as measured to the centerline of the capsill roller beam.

FRB peg – Designates the location of the front roller beam. It is placed 9.1m from the CRB peg to the centerline of the front roller beam.

RRB peg – Designates the location of the rear roller beam. It is placed 4.6m from the the FRB peg (measured centerline to centerline).

O peg – Marks the clear distance behind the capsill roller beam required to construct the bridge. It is positioned by measuring the R distance, Table 10, column (f), behind the CRB peg.

Table 11. **Bearings**

Bearing	Near Bank	Far Bank
Minimum	1.4m	0.9m
Maximum	2.3m	2.3m

Bearing Check. The minimum/maximum bearings for any DS bridge 2E + 13 through 2E + 22 bays are shown in Table 11.

To calculate the actual locations of the F and F' pegs, the following procedure is used:

Near bank bearing =
bridge length - (AR gap + 0.9m) where –

- Bridge length is obtained from column (b) of Table 10.

- The AR gap was measured by you in the first step of this design procedure.

- An assumption of 0.9m is made at this point in the calculation sequence because we know that this is the minimum acceptable bearing allowed on the far bank.

If the near bank bearing is within acceptable limits, you do not have to adjust the position of the F peg. Its final position will be the initial value that you assumed of 0.9m from the A peg. The F' peg

will be located at a distance equal to the near bank bearing measured from the A' peg on the near bank.

If the near bank bearing **is greater than** the maximum allowable (2.3m), you must do one of the following:

Move the F peg further away from its present assumed location to a point where the amount of bearing on near bank **is less than** or **equal to** 2.3m, and **greater than** or **equal to** 1.4m. This will allow the F' peg to be placed at a suitable distance from the A' peg.

Crib up the near bank end of bridge until the maximum allowable bearing **is not** exceeded.

Dig out the soil from the near bank until the maximum allowable bearing **is not** exceeded.

Physically locate the key construction points (Figure 8) on the ground and take elevations relative to the CRB peg.

Locate the O, RRB, FRB, CRB, F', A´, A, and F pegs on the ground along the centerline of the bridge.

Estimate elevations of F, RRB, and O pegs relative to the CRB. A positive value indicates that a point is above the CRB and a negative value indicates that it is below the CRB. The CRB will always be 0.0 elevation.

Place the key construction point elevations on the baseline below, Figure 8.

STEP 7. Slope check.

Ensure that the difference in elevation between the F' and F pegs does not exceed one-tenth of the total bridge length, if it does, you will have to crib up, undertake a major construction project, or choose another site. Note that the elevation of the F' peg cannot be lower than the elevation of the CRB peg or the bridge will not receive full bearing. In these cases, the normal procedure is to crib up or fill in until the elevation of the F' peg is at least as high as the CRB peg. Otherwise, you would have to remove the soil next to the bank to the level of the F' peg. This same rule applies to the F peg.
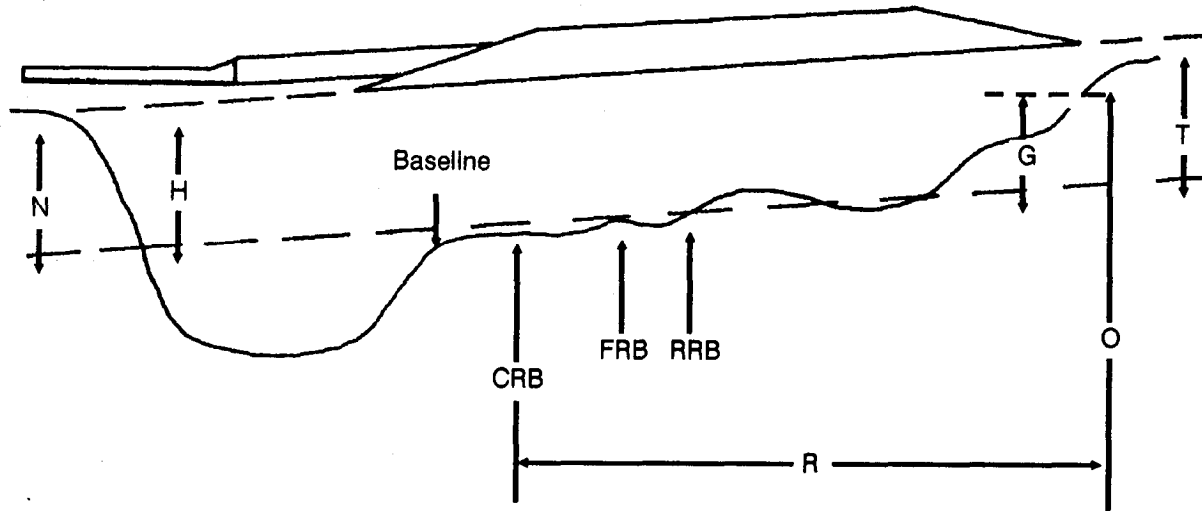
Figure 8. **Key construction points**
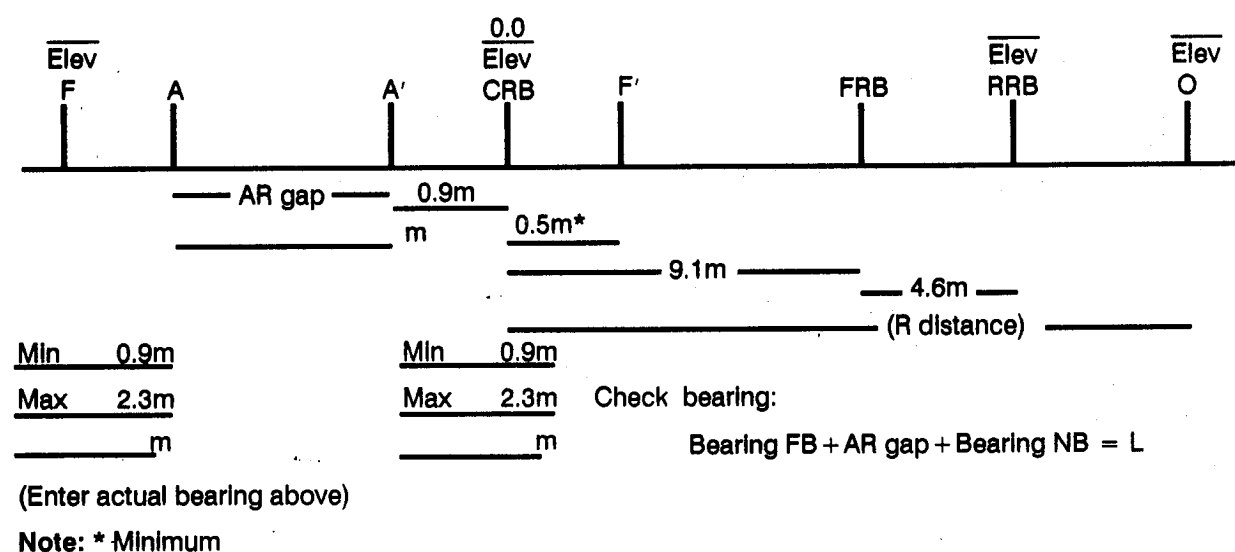
STEP 8.
Calculate the far bank height (H) and the near bank tall clearance (G) relative to the baseline using these formulas:

$$H = HtF + \frac{HtRRB \times (L - 0.5)}{13.7} \qquad\qquad G = HtO - \frac{HtRRB \times R \text{ distance}}{13.7}$$

STEP 9. *RULE 1*
Use an LNCG setting to give adequate nose clearance (N) and tall clearance (T). See Table 10, page 17.

Choose a setting from column (h), (i), or (j) which gives an N greater than H. If none of the three choices meet the criteria, choose the highest value available.

Check to see if the T value from column (g) **is greater than** G.

If N **is not greater than** H, proceed to RULE 2, or if T **is not greater than** G, proceed to RULE 2.

If N **is greater than** H and T **is greater than** G, the LNCG setting chosen has adequate nose clearance and the bridge selected has adequate tail clearance.

STEP 10. *RULE 2*
Raise both the capsill roller beam (CRB) and rear roller beam (RRB) by 0.253m to increase nose clearance (N) and tail clearance (T).

N RULE 2 = Value obtained from column (k).

T RULE 2 = Value obtained from column (l).

If N RULE 2 **is not greater than** H and T RULE 2 **is greater than** G, proceed to RULE 3a.

If N RULE 2 **is greater than** H and T RULE 2 **is not greater than** G, proceed to RULE 3b.

If N RULE 2 **is greater than** H and T RULE 2 **is greater than** G, the bridge has adequate nose and tail clearance for launching.

STEP 11. *RULE 3*
Lowering the RRB. If there is ample tall clearance, some increase in N can be obtained by keeping the CRB in its highest position and lowerlng the RRB to its lowest position. The mathematical equation for this process is shown under column (m).

N RULE 3a = N RULE 2 + Value N calculated from the equation shown under column (m).

STEP 12. *RULE 3b*
Lowering the CRB. If there is ample nose clearance, some increase in T can be obtained by keeping the RRB in its highest position and lowering the CRB to its lowest position. The mathematical equation for this process is shown under column (n).

T RULE 3b = T RULE 2 + Value calculated from the equation shown under column (n).

STEP 13. Loads required.
From Table 12, determine the the truck and trailer loads required for the bridge.

STEP 14. From Table 13, extract the following information:
Construction time _____

Manpower requirements _____

STEP 15. Final design:
2E + _____ bays

LNCG setting _____

CRB setting _____

RRB setting _____

Bearing: NB _____ FB _____

Truck and trailer loads _____

Manpower required _____

Time to construct _____

Table 12. **MGB pallets without LRS**

Pallet Type	Bays									
	13	14	15	16	17	18	19	20	21	22
Erection	1	1	1	1	1	1	1	1	1	1
Bridge	9	9	9	10	10	10	11	11	11	12
Total	10	10	10	11	11	11	12	12	12	13

Note:
More vehicles are required to transport personnel.

Table 13. **Work parties and building times on good sites (firm dry ground)**

(a)	Double-Story Single-Span 13-22 Bays Without LRS		
	13 Bays 33.2m MLC 50 (b)	18 Bays 42.4m MLC 30 (c)	22 Bays 49.7m MLC 16 (d)
Work party	1 + 24	1 + 24	1 + 24
Time by day (hours)	1 1/2	1 3/4	2
Time by night (hours)	3	2 3/4	3

Notes:
1. All timings exclusive of work on approaches.
2. Add 20 percent for untrained personnel.
3. Add 30 percent for adverse site conditions.
4. For disposition of work parties, see Table 32, page 40.